

500.000-12 (13:7) 1915  
SECTION III.—FORECASTS.

FORECASTS AND WARNINGS FOR SEPTEMBER, 1915.

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[Dated: Washington, D. C., Nov. 2, 1915.]

FROST WARNINGS.

A high area that entered the United States from British Columbia moved southeastward to the Ohio Valley and thence northeastward off the New England coast, and in connection with this high pressure area, warnings of frost were issued on September 21, 22, and 23 for portions of the Lake Region, the Ohio Valley, the North Atlantic States, and the northern portion of the Middle Atlantic States, and frosts occurred substantially as indicated in the warnings, although they failed of verification in the southern Ohio Valley and along the north coast of the Middle Atlantic States.

A high pressure area passed from Saskatchewan to Ontario from the 25th to the 30th, frost warnings being issued on the 26th, 27th, 28th, and 29th for the Lake Region, the northern Ohio Valley, New England, and the northern portion of the Middle Atlantic States. These warnings were justified in almost all cases.

STORM WARNINGS.

In connection with the storm that prevailed in the vicinity of the Bermudas from the 2d to the 8th, inclusive, warnings and advices were disseminated to Middle and North Atlantic ports during the 2d and the 3d, and high winds occurred along the Middle Atlantic coast where storm warnings were displayed. As far as indicated by reports, winds approximating gale force occurred off the coast.

For warnings in connection with the storm that crossed the Gulf coast near Apalachicola, Fla., on the morning of the 4th, see other portions of the text.

In connection with a storm that first appeared over Colorado on the evening of the 9th and passed rapidly northeastward, small craft warnings were ordered on the morning of the 10th for Lakes Michigan, Erie, and Huron, and during the afternoon they were supplemented by advisory warnings covering eastern Superior, northern Michigan, and northern Huron. Winds of gale force occurred over southern Michigan and western Erie, and strong winds elsewhere over the Lakes.

A storm passed north-northeastward from eastern Colorado on the 13th to Ontario by the 15th, and small craft warnings were issued on the 14th for portions of the Upper Lakes, and fresh to strong winds occurred.

From the 16th to the 18th there were indications of a disturbance of minor character near the extreme western end of Cuba and in the central Gulf, and shipping interests were advised accordingly. The storm, however, did not advance northward.

A storm advanced from southern Alberta on the evening of the 18th to the Grand Banks by the 23d. On the evening of the 19th storm warnings were ordered for western Superior, and on the following morning storm warnings were ordered displayed over the remaining portions of the Upper Lakes, except extreme southwestern

Lake Michigan, and advisory messages sent to ports on Lake Erie. On the morning of the 21st small craft warnings were issued for the New England coast, and during the afternoon storm warnings were ordered from Sandy Hook to Portland.

Warnings regarding the New Orleans hurricane appear in another portion of the text. Warnings were issued daily from the 22d to 30th, inclusive, in connection with this hurricane.

A storm developed over the Plains States, and on the morning of the 25th it was central over western Minnesota, whence it moved rapidly eastward to the Grand Banks by the 28th. On the evening of the 25th storm warnings were ordered for Lake Superior and northern Lake Michigan, and on the 26th for the Lower Lakes and southern Huron, and also for the Atlantic coast from Cape Henry to Eastport. Gales occurred over the Lake Region generally and along the middle and north Atlantic seaboard.

On the evening of the 26th warnings were continued on Lakes Michigan and Superior, at which time a storm was over Kansas and a marked high area over western Ontario. The low decreased in intensity and storm winds did not materialize. The warnings were accordingly ordered down on the morning of the 27th.

STORM OF SEPTEMBER 1-9 IN THE REGION OF BERMUDA.

On the 1st of the month the 8 a. m. cablegram from Hamilton, Bermuda, showed a pressure of 29.91 inches, the wind north and 26 miles an hour, and the weather cloudy. During the 1st, pressure fell steadily at Hamilton, and at 8 a. m. of the 2d the pressure was 29.46 inches, the wind northwest, 36 miles, and raining. The pressure continued to fall, and at 8 p. m. of the 2d, the barometer reported was 29.18 inches with the wind northwest, 24 miles, and raining. This disturbance remained central in the region of Bermudas until the 8th and much of this time the wind blew a gale from nearly all points of the compass. Without the aid of mail reports from vessels on the western Atlantic, the geographic position of the origin of this disturbance can not be definitely determined, but there is some evidence that it was present during the last days of August to the east-northeastward of the Lesser Antilles, whence it, in all probability, moved northwestward to the vicinity of Bermuda, and there meeting with high pressure in its path was held practically stationary for several days. It is also probable that this is the same storm that was encountered by one of the Royal Mail steam packets during the latter part of August in latitude 22° N. and longitude 47° W. On the 1st storm warnings were displayed on the North Carolina coast northward to Cape May and on the 2d the region covered by the warnings was extended northward to Cape Cod. The advices were to the effect that northerly gales would be encountered off the middle Atlantic and southern New England coasts. The warnings were justified. The highest winds were off the Virginia Capes, Cape Henry reporting a maximum velocity of 48 miles from the northeast at 8 p. m. of the 2d. Advices concerning this storm were disseminated daily

through the naval wireless. On the 9th the storm recurved west and north of Bermuda.

An interesting report of this was received from Capt. D. W. Wilson of the steamship *Kilbride*. The *Kilbride* was at anchor during the period covered by the report in Great Sound, about 3 miles off Gibbs Hill Lighthouse. By comparison with reports from the regular station at Hamilton, it seems that the barometer on board the *Kilbride* reads about 0.20 inch high. No corrections have been made. This report follows:

*September 1:* It blew fresh all day from the north; 3 p. m., barometer 29.65 inches and thermometer 80°; 9 p. m., wind backed to northwest, barometer 29.30 inches, thermometer 78°; an ugly, threatening appearance of the sky; 11 p. m., let go starboard anchor and paid out on both cables to 75 fathoms on port and 30 fathoms on starboard; very violent rain squalls all night.

*September 2:* 8 a. m., barometer 29.30 inches, thermometer 78°, wind still blowing hard from northwest; 1 p. m., barometer 29.18 inches, thermometer 81°; 4 p. m., barometer 29.03 inches, thermometer 81°, wind backed to west; strong wind and increasing in force; sky densely overcast, with drizzling rain at intervals.

*September 3:* 6 a. m., barometer 28.90 inches, thermometer 81°, wind backed to southwest, increasing in force all the time; noon, barometer 28.90 inches, thermometer 81°, gale rapidly increasing in violence with terrific squalls, dangerous confused sea running; 4 p. m., barometer 28.85 inches, wind backed to south, now blowing hurricane force; 8 p. m., barometer 29.05 inches, thermometer 81°, wind backed to southeast, blowing a hurricane with heavy sea, thick and misty, and unable to see any distance; 10 p. m., barometer 29.05 inches, thermometer 82°, still blowing hurricane force with heavy rain, sky densely overcast with very thick atmosphere; 11 p. m., barometer 29.05 inches, thermometer 82°; midnight, barometer and weather the same, using main engines, steaming head to wind and sea and using helm as required to prevent sheering and to relieve strain on cables. Heavy, short, and dangerous sea.

*September 4:* 1 a. m., barometer 29.05 inches, thermometer 83°, no change in weather; 4 a. m., barometer 29.05 inches, thermometer 82°, wind backed to east-southeast; 8 a. m., barometer 29.06 inches, thermometer 79°, wind backed to east; 11 a. m., barometer 29.10 inches, thermometer 78°, wind backed to east-northeast; noon, barometer 29.11 inches, thermometer 78°, tremendous hurricane, with blinding, heavy rain and densely overcast sky, unable to see any distance; 4 p. m., barometer 29.16 inches, thermometer 76°, wind the same (east-northeast), but less rain; 8 p. m., barometer 29.20 inches, thermometer 77°, hurricane abating a little, weather clear at times; sky overcast, much less sea.

*September 5:* 4 a. m., barometer 29.33 inches, thermometer 82°, wind the same (east-northeast), but much finer weather; 8 a. m., barometer 29.35 inches, thermometer 82°, wind decreasing, weather inclined to be squally, with heavy rain; noon, barometer 29.40 inches, thermometer 81°, wind backed to northeast, fresh breeze and overcast sky, with a promising appearance of the weather becoming settled; stopped engines; 4 p. m., barometer 29.40 inches, thermometer 82°, strong breeze and overcast sky; 10 p. m., barometer 29.45 inches, thermometer 79°, wind veered to east-northeast, weather improving.

*September 6:* Noon, barometer 29.50 inches, thermometer 78°, wind east-northeast, freshening and sea rising, heavy rain squalls.

*September 7:* 6 a. m., barometer 29.47 inches, thermometer 77°, gale, wind veered to east, using main engines and helm again as required; 4 p. m., barometer 29.30 inches, thermometer 75°, whole gale, wind veered to east by south, densely overcast, with continuous misty rain, unable to see any distance; 6 p. m., gale abating, sea falling; 10 p. m., barometer 29.25 inches, thermometer 81°, wind decreasing and veered to southeast, weather improving.

*September 8:* 2 a. m., great improvement in the weather, barometer 29.25 inches, thermometer 82°, wind veered to south-southeast, rough sea; 2 p. m., barometer 29.26 inches, thermometer 80°, fresh breeze, wind veered to south, weather misty, with drizzling rain; 5 p. m., barometer 29.25 inches, thermometer 77°, wind gradually veered to southwest, fresh breeze all night, with misty rain at times.

*September 9:* 8 a. m., barometer 29.57 inches, thermometer 78°, wind still southwest, moderate breeze, clear and improving weather; noon, barometer 29.62 inches, thermometer 80°, wind still southwest, weather improving all the time.

#### TROPICAL STORMS DURING SEPTEMBER.

Between the northeast trade winds of the North Atlantic and the southeast trades of the South Atlantic Ocean there lies a belt of relatively low pressure, light variable winds, calms, and vapor-laden air, commonly referred to as the "doldrums." This belt of calms separates the

general wind circulation of the Northern from that of the Southern Hemisphere, and it shifts northward and southward with the sun, but lags so that the sun reaches its maximum north declination in June, while the "meteorological equator" is farthest north in August. This belt is the birthplace of tropical cyclones or hurricanes, but it is only when this belt lies farthest north that the right-hand deflecting force of the earth's rotation becomes so effective that it gives the air moving toward some local area where the air has become superheated, a gyratory motion. Hence hurricanes are most frequent during the month of August and September. Why they should be more frequent in some years than in others is not yet understood.

Figure 4 (XLIII-113) shows for the West Indian and Gulf of Mexico waters the probable 24-hour movements of cyclones in the month of September. To illustrate: If the center of a cyclone is located in the vicinity of the end of one of the arrow shafts, then 24 hours later its center will be near the head of this arrow. The movements are the averages of all cyclones observed in September in the years 1873 to 1910, inclusive.

#### Tropical storm of September 2-7.

When a powerful storm is in the region of Bermuda it is uncommon to have a storm of other than minor intensity in southern waters adjacent to the United States. However, a storm of small diameter, but of great intensity, made its appearance near Isle of Pines the afternoon of the 2d and moved thence on a northerly course and crossed the coast line near the mouth of the Apalachicola River during the early morning hours of the 4th, losing its intensity immediately thereafter, but retaining its identity until it reached the region of the Great Lakes. In the forenoon of the 2d the following special advice was received from the official in charge at Key West, Fla.:

Clouds give evidence (of) perfect cyclonic organization central nearly south.

Special observations at 4 p. m., from Habana, were immediately called for and these showed a storm in the vicinity of the Isle of Pines. Storm warnings were immediately ordered displayed on the south Florida coast, and the following advisory message was distributed:

Northeast storm warnings displayed south Florida coast. Tropical disturbance at 4 p. m. to-day, central near Isle of Pines and moving toward the northwest. It will be dangerous for shipping in southern Florida and east Gulf waters during the next two days.

During the morning of the 3d several special observations were received from the steamship *Turrialba*, as follows:

#### Observations on the *Turrialba* September 3, 1915.

Hour of observation.	Latitude.	Longitude.	Barometer.	Temperature.	Wind direction.	Force.	Weather.
			Inches.	° F.			
2 a. m. ....	24 20	84 02	29.62	80	ne.	9	Rainy.
4 a. m. ....	24 18	84 00	29.08	80	sw.	6	Rainy.
7 a. m. ....	24 10	83 50	29.56	82	sw.	8	Cloudy.
8 a. m. ....	24 00	83 40	29.70	82	s.	7	Cloudy.

These reports, together with that of the *Miami* which follows, enabled the forecaster at Washington to locate quite accurately the center of the disturbance. The following report was received from the U. S. Coast Guard Cutter *Miami* by radio:

Approximate position, latitude 24° 46', longitude 83° 50'. Storm center passed to east of our position about 7 a. m., wind north 80 to 100 miles, barometer 29.38. Wind shifted to west 8 a. m., and moderating.

Hurricane warnings were accordingly issued for the western coast of Florida and thence westward to the mouth of the Mississippi River. In these warnings it was predicted that the storm center would strike the coast between Cedar Keys, Fla., and New Orleans, La. Actually it crossed the coast line about midway between these points. These warnings were as follows:

(Issued Sept. 3, 9:10 a. m.)

Hoist hurricane warnings 10 a. m. New Orleans to Cedar Keys and southeast storm warnings at Tampa. Tropical storm central this morning in Gulf in latitude 25° and longitude 85°, approximately, and moving northwest toward middle Gulf coast. It will probably strike Gulf coast between New Orleans and Cedar Keys, and hurricane warnings are ordered accordingly. Advise all interests.

(Issued Sept. 3, 11:08 a. m.)

Change to southeast storm warnings Boca Grande to Jupiter. Fresh southeast and south gales on the southwest Florida coast and strong southeast winds on southeast Florida coast. Storm apparently moving north-northwestward.

(Issued Sept. 3, 11:52 a. m.)

Hoist hurricane warnings Rockwell to Puntarasa. Storm moving north in about latitude 26°, longitude 84° to 85°. Winds of hurricane force off the coast this afternoon and to-night.

(Issued Sept. 4, 9:20 a. m.)

Advisory storm warning. Center of tropical storm apparently approaching Gulf coast near the mouth of Apalachicola River. Will pass inland late this afternoon or to-night and then diminish in intensity. Hurricane warnings limited to region between Panama City and Cedar Keys, Fla.

After crossing the coast line this disturbance decreased in intensity as it passed northward to Lake Huron and lost its identity by the evening of the 7th.

This storm apparently originated south of Cuba and passed northward near Isle of Pines. A report from the Cuban Meteorological Service states that the barometer at Pinar del Rio on the 2d at 7:30 p. m. was 29.74 inches, wind northeast, 20 miles; and at 10:30 p. m., the barometer was 29.70, wind northwest, 26 miles. The wind having backed from northeast to north-northwest, it may be inferred that the center of the hurricane passed to the east of the city. Comparing these observations with those at Habana, where the minimum pressure, 29.66 inches, was observed at 11:45 p. m. of the 2d, with a maximum wind velocity of 50 miles from the southeast at the same hour, it follows that the center of the disturbance passed in the vicinity of San Cristobal, in Pinar del Rio, and passed to the Gulf near La Mulata. The minimum barometer at the Isle of Pines was 29.52 inches at 5 p. m., to which it had fallen from 29.72 at noon.

*Key West report.*—No casualties or damage at or in the vicinity of this station. Lowest barometer 29.76 inches about 3 a. m. of the 3d.

*Tampa report.*—In this vicinity very high tides were reported, some the highest of record. At St. Petersburg, Fla., the tide exceeded by 4 feet 10 inches, the previous high record. Damage from wind and tide is confined to that portion of the coast north of Manatee. The greatest damage was done to the sponge fleet. At Passa Grille the sea wall was considerably damaged by the extremely high seas. An aneroid barometer (recently compared) at Passa Grille showed a reading of 29.60 inches, 0.18 inch lower than at Tampa. The official in charge at Tampa remarks: "This means a gradient of 0.18 inch in 25 miles. The tide was the highest of record at Manatee. At Clearwater there was not much wind, but the highest tides in years."

Every available means was employed to disseminate the warnings—rockets, flags, telephone, telegraph, launches, etc. The storm moved so rapidly that the Weather Bureau warnings were issued hardly 24 hours in

advance. They undoubtedly saved many lives and much property.

*Jacksonville report.*—The tide was unusually high at all Gulf stations, unprecedented some reports indicate. The loss of life was confined to fishing and sponge vessels at sea which had no knowledge concerning the approach of the storm. The apprehension awakened by the recent hurricane that traversed the Gulf coast striking the coast line of Texas near Galveston, was still much alive and to the fear thus provoked, together with the usual accuracy of warnings, must be attributed the small loss of life and property during the storm of September 3-4. Warnings were heeded by large and small vessels, possibly as never before, all realizing that indifference might exact the penalty of great disaster. Thus again is exemplified the value of the bureau to the marine and industrial interests of the country. At Apalachicola the wind was highest, 60 to 70 miles an hour, from the east-southeast between 4 and 7 a. m. of the 4th, veering to southwest. The loss of timber on turpentine farms will be about 10 to 15 per cent or more. The damage to buildings, small boats, and other exposed property, including telegraph and telephone wires will approximate \$25,000. The tide was highest about 5 a. m., having risen 4 feet above normal within about an hour. No lives were lost in the city, owing to the timely precautions taken by all interests. Small vessels sought harbor, although many small boats and one tug were sunk. From 4 a. m. to 7 a. m. the wind blew from 50 to 60 miles an hour, and for 30 or 40 minutes it was 70 miles. The warnings on the 2d and 3d gave every one ample time to put boats, barges, and all floating property in harbor. The lowest barometer reading was 29.32 inches at 6:40 a. m. At Carrabelle the tide was 7 feet above normal. No lives were lost, but fences, telephone poles and smokestacks were blown down, piers were washed away, several barges and small boats were blown ashore into the marshes and left high and dry after the storm. The highest wind velocity of 60 to 70 miles an hour (estimated) occurred about 6 a. m. from the southeast. The lowest barometer was 29.45 inches at 5:30 a. m. of the 4th. Warnings were received in ample time and highly valued. All interests were prompt in taking protective measures. At Cedar Keys the highest wind velocity, about 40 miles an hour, occurred during the night of the 3d-4th from the southeast. The tide was very high. No lives lost and damage to property small, as warnings were received in time and preparations for safety taken by all. At Panama City the wind was very high and backed from northwest to southwest. The highest velocity occurred at about 7 a. m. Some roofs were blown off and several fishing vessels went ashore. The warnings were received in time, and all shipping and the public were warned to make everything safe. Small boats went into the harbor and the larger ones used every precaution. Everybody appreciated the Weather Bureau advice.

*Pensacola report.*—The tide was not unusually high. The highest wind velocity was 33 miles an hour from the north at 11:08 a. m. of the 4th. The lowest pressure was 29.80 inches at 10 a. m. of the 4th. There was no damage. At St. Andrews the lowest barometer reading of 29.40 inches occurred at 7:45 a. m. On the morning of the 4th the wind had backed to north, and by 5 a. m. began to increase in velocity and was coming in gusts of 50 to 60 miles an hour. A little before 7 a. m. the wind shifted to northwest and possibly for a moment blew 80 miles an hour. It was then that the most damage was done in the way of uprooting and twisting off of trees.

*Tropical storm of September 22-30.*

On September 22, in the "doldrums" in about latitude 15° N. and longitude 64° W., the forecaster on duty at the central office at Washington, D. C., detected the first signs of the formation of another hurricane, although he had no reports from that immediate region. This storm began to manifest its presence by the changed wind directions, by the clouds and their peculiar movements that usually occur when a hurricane is somewhere near. Advices on the 22d were sent West Indian stations and shipping bound for West Indian waters. Later reports confirmed the deduction that a storm was in process of formation, and day to day thereafter until the storm passed inland near the mouth of the Mississippi River advices and warnings were issued for the guidance of shipping and the residents of the Gulf coast regions. The track of this hurricane is shown on figure 1, m. c. 3 (XLIII-113), which also shows the track of the hurricane that passed near Galveston on August 16, 1915, and the one of lesser importance that passed inland near the mouth of the Apalachicola River on September 4, 1915. It is in fact unparalleled that three hurricanes should reach the Gulf coast within a period of approximately six weeks.

The New Orleans hurricane was equal to and possibly surpassed in intensity the one that occurred at Galveston in August. At New Orleans the lowest pressure, reduced to sea level, standard gravity, etc., was 28.11 inches, which is the lowest reading ever recorded at a Weather Bureau station, and the extreme wind velocity was approximately 130 miles an hour from the east. Figure 5 (XLIII-114) shows the sea-level pressure at New Orleans during the coming and passing of the storm. Figure 1 (XLIII-112) is the weather map of 8 p. m., September 29, or approximately two hours after the center of the storm passed immediately west of New Orleans. The pressure at New Orleans was then rising. The continuous lines on this chart are drawn for each 0.10 inch of pressure, except in the immediate vicinity of the storm center, where the gradient is so very steep that it is not possible to show the lowest closed isobar. The arrows show the direction of the wind at the various stations within the storm area; the number of feathers on the staff of an arrow indicates the force of the wind (Beaufort scale) at the time of the observation.

On the morning of September 28, the following warning was sent Gulf ports, whence it was disseminated by every available means:

Tropical storm attended by dangerous winds central this morning over the Gulf of Mexico in approximately latitude 24° and longitude 87°, moving northward toward the mouth of the Mississippi River. Its influence will be felt late to-night and Wednesday on the middle Gulf coast.

At 3 p. m. of the 28th hurricane warnings were ordered displayed and disseminated on the Gulf coast from New Orleans, La., to Pensacola, Fla. The message read as follows:

Hoist hurricane warnings 3 p. m. New Orleans to Pensacola. Tropical storm center near latitude 26° and longitude 88° and moving northward. Dangerous winds late to-night and Wednesday. The storm center will probably strike the coast near or immediately east of the mouth of the Mississippi River. Advise all interests.

Of especial importance and helpfulness to the forecaster in the preparation of the advices and warnings concerning this storm, which from the time of its formation in the eastern Caribbean Sea to the time it struck the mouth of the Mississippi, did not pass close to a land station, were the wireless reports from vessels at sea.

While no one of these vessels reported from the immediate storm center, yet their reports were invaluable in that they permitted the center to be located approximately twice each day.

The following is a record of the more important advices and warnings issued by the Weather Bureau from the time the hurricane made its first appearance over the eastern Caribbean Sea until it passed inland near the mouth of the Mississippi River:

*September 22.*—There are some indications of a disturbance over the Caribbean Sea immediately west of the island of Dominica. (This information was transmitted to Porto Rico and the Windward Islands.)

*September 23.*—Some indications of a disturbance central over the Caribbean Sea in latitude 15° and longitude 67°. (This information was sent to all West Indian stations, to important ports on the Atlantic and Gulf coasts, and distributed by United States Radio Service to vessels at sea.)

*September 24.*—At 4 p. m. to-day the pressure was low over the Caribbean Sea, and there were indications of a disturbance south-southeast of Kingston, Jamaica, where the wind was east, force 2, and the barometer read 29.74 inches. Strong easterly winds are prevailing on the south coast of Haiti. This disturbance will probably move west-northwest. (This information was given a distribution similar to that given the advices of the 23d instant.)

*September 25.*—Tropical cyclone central this morning immediately southwest of Jamaica and moving toward the Yucatan Channel. Vessels bound for Yucatan Channel and western Caribbean Sea should exercise every precaution. (This information was distributed to all Atlantic ports, Habana, and the vessels at sea by means of the Naval Radio Service.)

*September 26.*—Tropical cyclone over the Caribbean Sea central south of western Cuba and apparently moving northwest toward the Yucatan Channel. Vessels sailing for the Yucatan Channel and western Caribbean waters should exercise extreme caution. (This information was distributed in a manner similar to the advices of Sept. 25.)

*September 27.*—The tropical cyclone over the western Caribbean Sea is central near and southwest of the Isle of Pines, and apparently moving northward. It is dangerous for vessels in western Cuban and southern Florida waters and the Yucatan Channel. (This advice was given widespread dissemination to the South Atlantic and Gulf seaports and vessels at sea by means of Naval Radio Service.)

*September 28.*—Tropical storm, attended by dangerous winds, over Gulf of Mexico in approximately latitude 24° and longitude 87° and moving northward toward the mouth of the Mississippi River. Its influence will be felt late to-night and Wednesday on the middle Gulf coast. At 10 a. m. storm warnings were displayed on the middle Gulf coast, and at 3 p. m. an order to hoist hurricane warnings was sent to the region between New Orleans and Pensacola. This warning read as follows:

Tropical storm center near latitude 26° and longitude 88° and moving northward. Dangerous winds late to-night and Wednesday. Center of storm will probably strike coast near or immediately east of the mouth of the Mississippi River. Advise all interests.

*September 29.*—The following information was distributed on the Louisiana coast:

Tropical disturbance moving toward southeast Louisiana. Center will probably pass between New Orleans and Atchafalaya Bay. Easterly gales, probably reaching hurricane force on eastern Louisiana and strong northerly winds to moderate gales on west coast to-day and to-night. High tides.

Also hurricane warnings were continued on the Mississippi, Alabama, and extreme northwest Florida coasts, east to south gales being forecast for the afternoon and night.

A detailed statement concerning the hurricane, September 22-29, at New Orleans appears elsewhere in this Review. (See pp. 456-466.)

#### DISTRICT WARNINGS DURING SEPTEMBER.

*Chicago district.*—There were no special warnings issued during the month with the exception of frost or freezing temperature, and the more important warnings for the various sections were as follows:

*12th.*—Freezing temperature for North Dakota and Montana (verified at the majority of the stations therein).

*20th.*—Frost for the entire Northwest from the upper Mississippi Valley westward (fully verified).

*21st.*—Frost for the western Lake region and the upper Mississippi Valley (partly verified).

A warning was issued on the 20th for the Wisconsin tobacco region, as follows:

Frost indicated to-night in tobacco region of western portion of the State. Conditions a little doubtful in southern and central portions, but frost possible. Frost quite likely, however, Tuesday night.

During the month a number of long-range forecasts covering three days to a week were requested by local Exchanges or State Fair Associations in various sections, as follows: On the 11th, Huron, S. Dak., one week; 13th, Madison, Wis., three days; 17th, Springfield, Ill., one week; 18th, Sioux City, Iowa, two days; 19th, Helena, Mont., one week; 25th, Sedalia, Mo., one week; and on the 27th, Peoria, Ill., five days. These forecasts met with exceptional success and were fully verified in practically every case.

*Denver district.*—Frost warnings were issued for portions of the district on a number of days during the month.

*New Orleans district.*—No important warnings, except those in connection with the hurricane, which are given elsewhere (pp. 456-466).

*San Francisco district.*—On the 10th, 23d, 24th, and 25th warnings of probable showers were issued to the fruit-drying interests, and while the reports from regular Weather Bureau stations in this district show rain in only a few instances, scattered light showers occurred in most sections, especially the mountain and foothill districts, and the warnings were justified.

*Portland district.*—Not received.

#### NORTHERN HEMISPHERE PRESSURE.

*Honolulu.*—Pressure averaged near, though slightly below, normal. The principal lows and highs occurring as follows: Lows, 9th-10th, 18th, and 21st-22d; and highs, 25th and 28th-29th.

*Alaska.*—Pressure averaged slightly below the seasonal average, except at Sitka and Dutch Harbor, where it was slightly above. Lows occurred about the 2d, 6th-7th, 13th-15th, 25th and 29th, and highs about the 4th-5th, 10th, 16th-19th, and 22d-23d. The principal high was that of the 10th, and the principal lows were those of the 25th and 29th.

*Azores.*—Pressure averaged nearly normal, although slightly below. Fluctuations were not marked. Pressure was below the normal from the 10th to 22d and above thereafter.

*Bermuda.*—Pressure averaged below normal, being continuously below during the first decade and above during the greater portion of the remainder of the month.

*United States.*—Lows occurred about the 7th-9th, 13th-14th, 20th, and 26th, and highs about the 2d, 11th, 15th-16th, 17th-18th, 22d, and 24th-25th.